Preparations for Rhode Island Risk-Limiting Audit

Tentative Audit Timeline

Thu 11/19	Ballot manifest/data is uploaded into Arlo and "frozen." Audit setup complete in Arlo.
	Public ceremony for random seed selection Audit is launched. Batches are selected for audit.
Fri 11/20	Batches are delivered and secured Site preparation Process run-through/refinement by leads
Mon 11/23	Hand count and data entry begin

As of 11/3, the margin in the presidential contest is slightly over 20 points. The required sample at a 9% risk limit is expected to be **12 batches**.

Three municipalities had a 2-card ballot: Cranston, Pawtucket and Smithfield. All others were 1-card.

Audit preparations

These are being serially updated to reflect actual practice in the 2020 presidential election.

Note: The audit preparations include compiling three data files:
- The "enhanced mail ballot manifest" contains information on batches of mail ballots that were tabulated on the Board's DS850 scanners, including number of *cards* and the range of serial numbers associated with those cards.
- The "ballot manifest" (provided to Arlo) contains the batch name and number of *ballots* ("card 1s") for every batch of ballots in the election. Ballot count, not card count, is the relevant number for RLA computations.
- The "batch tally report" (provided to Arlo) contains the batch name candidate vote tallies (counts) for each batch of ballots in the election. (This report has eight columns: batch name, the six named presidential candidates, and write-in.)

1. Before being scanned, mail ballots are batched by city/town in batches of about 800 ballots apiece. (This size was chosen for convenience in storage and because smaller batches would yield little overall improvement in 2020.)

2. For mail ballots, after each batch is scanned, two copies of the batch/bin reports are printed.[1] One is taped to the ballot storage box, one placed in a binder. (These reports help complete and check the ballot manifest, and provide a useful visual confirmation when a batch contains "misfiled ballots" from other municipalities.) Also at this time, each batch is assigned a batch name with an accompanying label. For instance, Bristol's municipality code is 02, so the fourth mail batch from Bristol would be named M0204 (not to be confused with ballots from Bristol precinct 0204).

3. The "enhanced mail ballot manifest" for mail ballots can be compiled from labels and reports on the ballot storage boxes. This manifest contains not only batch names and ballot card counts, but also the first and last CVR numbers according to the batch/bin report. For instance, in the example below, the first number is 0237013177, and the last number is 0237013475. (Note that the "total sheets" is considerably smaller than this range implies, presumably because some ballots needed to be rescanned. *The batch ID given here is not used in the audit*.)

Batch:	batch_2020-09-07T14_39_11
Total Sheets:	273
Number Range:	0237013177 - 0237013475
Batch Started:	09/07/2020 14:35:35
Batch Completed:	09/07/2020 14:39:11

4. After all mail ballots have been processed:
   a. Delete blank rows and save the file under a new name such as "enhanced mail ballot manifest Nov 2020.csv."
   b. Provide this file, a cast vote record file containing (at least) all the mail ballots, and the corresponding "table view" file to Verified Voting.
   c. VV will use (and provide) open-source Python code to compute the mail-ballot portions of the ballot manifest and batch tally report: namely, ballot (card 1) counts and candidate vote totals for each mail batch.

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[1] Sample Batch Reports: https://drive.google.com/file/d/1Rj-azEqvHRSOEhFLH89RXqXwaqFCHlnx/view?usp=sharing

5. For the remaining ballots -- emergency ballots by site and scanner, election day ballots by site and scanner, and any other batches (e.g. containing hand-counted ballots, remade ballots, etc.) -- use machine tapes, election certificates, and voting system reports to prepare and reconcile the remainder of the ballot manifest and batch tally report.

6. When the ballot manifest and batch tally report are complete, check the totals for correctness.

7. When the manifest is complete, and before the audit begins, "commit" or "freeze" the manifest and batch tally report. We recommend computing a SHA-256 hash "signature" of these files and publishing, and/or otherwise sharing, both the files and the signatures.[2]

8. Publicize the random seed selection and the subsequent portion of the audit, which will take place the following week, once selected batches are retrieved from jurisdictions.

9. Log into Arlo, the RLA software tool, as the audit administrator. Enter the basic election data, including the vote totals for the target contest (presidential) ("target contests" page in Arlo) and the risk limit, 9% ("audit settings" page).

10. Log in as the jurisdiction official and upload the ballot manifest and "batch tally report" (in Arlo, this report is labeled: "candidate totals by batch").

11. Check the supply list; obtain or print any materials needed for the audit. [VV is drafting tally forms, batch logs, judge reporting sheets, and stack labels.]

12. Recruit audit board members and other staff to perform the work of the public audit. We provisionally anticipate:
    a. Possibly one or two people to move batches from a storage area to the audit space as needed.
    b. Two people to handle ballot custody: opening and ultimately securing batches, dividing the batches into piles, checking the piles in and out.

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[2] An online tool for this purpose is available at https://emn178.github.io/online-tools/sha256_checksum.html. On a Windows computer, you can open a command prompt window in the directory where the file is saved, and then enter the command "certutil -hashfile {filename} SHA256" (if the filename contains spaces, put it in quotation marks). To save the output to a file, add "> {output filename}" at the end of the certutil command.

c. Two runners to deliver piles, double-check consistency between the audit tally reports, and return the piles to the ballot custody team.

d. Multiple hand count teams of two (possibly between 6 and 10 teams, to be determined).

e. Two people to enter audit tally reports into a spreadsheet, check those entries, and ultimately to enter batch totals into Arlo and check them.

f. Two people to interpret dispute or undecided votes/markings; help resolve any questions or disputes in counts that hand count teams may have.

13. Design the spaces where the audit will occur. Considerations:

a. Ample table space for dividing batches into piles and checking the piles out and back in; consider where to stage the batches for convenience and security

b. One table per hand count team, supporting social distancing

c. Data entry should be projected; consider ways to display spreadsheet and Arlo interface simultaneously

Public audit (part 1): random seed selection

1. Conduct the public ceremony to select a random seed. Explain the process, and show the audit settings entered into Arlo. Then invite people to participate in creating the random seed. Typically, anyone in the room and willing to participate lines up in an arbitrary order, and the participants take turns removing one of 20 (sanitized) ten-sided dice from an opaque container and rolling the die they removed. (People can take as many turns as necessary.) Write each digit on a blackboard, whiteboard, or easel in full view. When the 20-digit seed is complete, type it into Arlo; read it back to confirm that it has been typed correctly before submitting the seed.

   It is also helpful at this point to publicly communicate the seed by publishing it on a website and/or social media.

2. Log in as a jurisdiction admin to access the list of batches to be audited. The jurisdiction admin will first enter the number of audit boards at this stage and should set only one audit board. Once the number of audit boards is selected, Arlo will output a list of the batches to be audited.

3. Show the list of batches to be audited, and reiterate the timeline for the next stages of the process.

Preparing for the hand count

1. Request necessary batches from municipalities. For election day voting, if multiple scanners were deployed, request *all* batches from any precincts in the sample. (This is a hedge against possible mislabeling.)

2. Print customized Pile Reporting Sheets and envelope labels based on the piles (portions of batches) to be created and counted during the hand count.

3. Set up the audit stations. Spaces on the table are designated for the candidates' stacks of votes (and, if applicable, for "Card 2s" that do not include the presidential contest), using stand-up label cards to identify the stacks. (These labels can be placed on the table for convenience, bearing in mind that the vast majority of ballots will be cast for Biden or Trump.)

Public audit (part 2): conduct the batch hand counts

We generally recommend starting with batches at least large enough so that each audit team has at least two piles to count, but not necessarily the largest in the sample.

1. At the batch retrieval/ballot custody station, calibrate a relatively sensitive scale to a known number of in-person ballots, at least 50. (It is best to do this with voted ballots of the same type as are currently being audited; mail ballots may differ in weight from ballots cast in person.)

2. The batch retrieval team jointly opens one batch (or container) at a time, **checking seal numbers and other documentation as applicable.** One member of the team begins dividing the ballots into "piles" of *approximately* 50 ballots apiece. (The actual count may vary, due to variations in weight.) Place each pile in a labeled envelope (for instance, if a batch is "ED2307", the labels would say ED2307 Pile 1, ED2307 Pile 2, …). On the envelope label, report the estimated number of ballots.

   Once a sufficient number of piles have been created (at least one per hand count team, plus a few extra), begin "checking out" piles to the hand count teams. Runners will check out the piles, recording on the log the hand count team number, time out, batch name and pile #, and bring the piles to the hand count teams.

3. The hand count teams will count each pile for the presidential contest as follows, using the Sort-and-Stack method:

   a. Together, sort the piles into stacks for each named candidate, write-in, undervote, overvote, and "disputed" ballots on which the judges could not agree. If there are any ballot "Card 2s" included in the pile, they should all be

sorted into a separate, single stack.

We propose socially distanced turn-taking: Judge #1 (preferably) stands at one side of a large table. Judge #2 stands on the other side. (Audit teams are allowed to sit, but should preserve as much distance as possible.) The pile of unsorted ballots is placed in the center. Table tent cards are used to identify stacks of votes/non-votes, as described above. Judge #1 takes a ballot from the pile, examines it, then passes it to Judge #2. They then verbally agree on which candidate received the vote before Judge #2 places the ballot on the appropriate stack. For the second ballot, Judge #2 is the one to take a ballot from the pile, and the judges continue to alternate in this fashion until the entire stack is completed.

If the judges don't agree on the interpretation of a particular ballot, they place it into a separate stack for review by a Vote Review Panel.

b. Once sorting is complete, each judge takes a turn hand-counting each stack, cross-stacking in smaller stacks of ten. (Presumably most ballots will be in the Biden and Trump piles; these piles can be counted simultaneously, then swapped.) Each judge verifies that each ballot bears the correct vote. Each judge notes their individual count for each stack (candidate 1, candidate 2, etc.) on their reporting worksheet. When the counts agree, the consensus count for that stack is recorded on the Pile Reporting Sheet for that pile. If judges have difficulty getting their counts to agree, they can signal the Vote Review Panel for assistance.

[Alternatively, the hand count could proceed as in Georgia, with a single count in which both team members touch every ballot.]

4. When the judges have finished with all stacks, they return the ballots, except for any disputed/undecided ballot (these will go in their own envelope, with a "Disputed Ballot" label that identifies the batch and pile#), and the reporting sheet to the pile envelope and signal the runners.

5. A runner double-checks the total number of ballots in the pile, comparing the initial batch count (as estimated by the scale) on the envelope label with the total number of ballots listed on the Pile Reporting Sheet. The runner then writes the confirmed ballot count on the envelope label and returns the pile to the batch retrieval team. If

there are any disputed/undecided ballots, the runner provides these to the Vote Review Panel for their adjudication. Once complete, these are to be taken to the ballot retrieval team to be reunited with their original pile. The runner can signal the Vote Review Panel to re-count a pile if the final count for a pile is significantly different from the initial total.

6. The batch retrieval team receives a completed pile envelope from the runners, removes the reporting sheet, records the "time in" on the log, and checks out another pile for the judges. Completed pile envelopes can be returned to the original container or otherwise set apart if waiting for ballots from the Vote Review Panel. (The envelope label will indicate if disputed ballots are out for review.)

7. To spot-check the counts, once per hour, the Vote Review Panel will select one pile to recount, preferably selecting a pile from different teams of judges each hour.

8. The completed Pile Reporting Sheet is given to the data entry team. **[The best way to accomplish this may depend on the room layout.]** One data entry team member reads aloud the totals for each pile to the second team member, who enters them into a spreadsheet that calculates batch totals. (If a reporting sheet includes a count for "second cards," these are recorded in a separate column in the spreadsheet.) The second team member then compares the Pile Reporting Sheet to the spreadsheet entries to confirm.

9. When all piles for a batch have been counted and their totals recorded, the data entry team computes the batch tally totals. The **[Vote Review Panel / data entry team/?]** will then spot-check these totals against the reported batch tally totals to check for gross discrepancies that merit immediate investigation. Assuming that no procedural error in the audit is found, the data entry team enters the tally totals into Arlo.

10. Once the tally totals are checked and entered, the batch retrieval team resecures the batch, making sure that all ballots (piles) and any ballots reviewed by the Vote Review Panel are included.

11. When all batches have been hand-counted and their tallies entered, Arlo computes the measured risk for the audit and determines whether it can conclude. In the unlikely event that the risk limit is not met, additional batches will need to be delivered and hand-counted.